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A monthly report on pesticides and related environmental issues

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In This Issue

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Is It Snake Oil?

The Dangers of Cavalier Pest Control

Dr. Catherine Daniels, Pesticide Coordinator, WSU

A lovely irony is blooming. On one side groups are pushing for quick availability of safer, less-toxic chemistries to control pests, and on the other side groups are pushing for tighter regulation on products to prevent potential damage to humans and the environment. Can you guess the names of those groups? One side is represented by university scientists and state regulators, the other side is represented by consumers. But which group is on which side?

When is a "Master Gardener" NOT a Master Gardener?

In an August 24, 1999, article in *USA Today,* the battle lines were neatly described. Consumers are voting with their pocketbooks for what they believe are safer, less-toxic chemistries by supporting Public Broadcasting Station (PBS) affiliates that carry Jerry Baker, the self-described "America's Master Gardener." Among other things, his advice to home gardeners is to use "tonics" made from such things as chewing tobacco, human urine, birth control pills, mouthwash, molasses, detergent, and beer. What are his qualifications for dispensing such advice? He has television presence and he is a "superstar" on PBS fundraising drives. Never mind that he is **not** part of the university Cooperative-Extension-based Master Gardener programs, which have dispensed science-based information since their inception in 1971.

Is Baker a problem, from a scientific perspective? Scientists in Ohio thought so, when they petitioned their local PBS station in Columbus to remove Baker's show, citing examples of improper and illegal recommendations for pesticide use given by Baker during the shows. Their complaints were rebuffed by the station.

Pseudo-Science: Does It Really Hurt Anybody?

Some interesting examples of Baker's recommendations given in the *USA Today* article included frequent shampooing of lawns and plants to improve photosynthesis and the inclusion of a tablespoon of bourbon with a plant fertilizer. These recommendations fall into the "snake oil" category: they likely won't hurt the plants, but the benefits are dubious. (Unless

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Snake Oil, cont.

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perhaps you give the plant the fertilizer and you take the tablespoon of bourbon yourself. At least you might feel better about the plant afterward.) Other examples of Baker's recommendations are not so funny. To kill bugs, use a chewing-tobacco-and-water mixture. To kill suckers growing on trees, Baker recommends using "any good weed killer" with dish soap, vinegar, and gin. After pruning flowering trees, Baker recommends sealing the wounds with latex paint, antiseptic mouthwash, and an insecticide such as Sevin or Dursban. What's wrong with those three recommendations? (1) Nicotine is a lethal human poison; (2) Roundup (a "good weed killer") can severely damage trees; (3) using Sevin around blooming plants is an extremely irresponsible action that leads to bee kills, exactly the type of environmental damage that consumers profess to abhor.

Everyone has heard stereotypical comments about academics, from the stuffy "ivory tower mentality" to the more impertinent "egghead." While Baker was not quoted using any of those comments, he did say "the redwood trees grew just fine before we had garden centers and people with academic certificates. I can't worry about what the competition says." It should be news to scientists and regulators that they are "the competition" for consumers' attention and welfare. Odds are that scientists and regulators believe they are working for the consumer, primarily toward guaranteeing that marketplace products are safe to humans and the environment when used as stated, that those products consistently meet stated efficacy claims, and that each lists its active ingredients on the label.

Is Jerry "Master Gardener" Baker the only perpetrator of egregious recommendations? Of course not. Should we "egghead" academics in our "ivory towers" be concerned? I think so.

"Minimum Risk:" Says Who?

The marketplace is full of labels classified as "minimum risk;" as such, they require no Environmental Protection Agency (EPA) registration number and are loosely called 25(b) products. (See Federal Register of March 6, 1996, 61 FR 9976.) University scientists and state regulators are concerned that labels are in the market with illegal ingredient statements, few or no guidelines for the use of personnel protective equipment, and no assurance that the product has had even a cursory efficacy review before entering the marketplace. These labels give the consumer the impression that the product is non-toxic, encouraging by default unnecessary human and environmental exposure. Indeed, concern is high enough among these scientists and regulators that they have drafted a letter to EPA through the American Association of Pesticide Safety Educators, requesting that the 25(b) regulations be revisited with an eye toward tightening them.

Consumers are often the first to demand greater protection... is that only when the bugs are in someone else's back yard?

Consumers are usually the first to demand tighter regulations to protect the unwary from being bilked by snake oil salesmen. They are often the first to demand greater protection of humans and the environment from unnecessary pesticide exposure. But that seems only to be the case when the bugs are in someone else's backyard.

Dr. Catherine Daniels is the Pesticide Coordinator at WSU's Pesticide Information Center. Despite her ivory tower location, she can be reached relatively easily at (509) 372-7495 or ***cdaniels@tricity.wsu.edu*** *.*

Anatomy of a Recommendation

WSU's Pesticide Publication Review Process

Dr. Catherine Daniels and Sally O'Neal Coates, Pesticide Information Center, WSU

Have you ever wondered what goes on behind the scenes in the process of publishing a pesticide usage recommendation?

When one homeowner chats with another over the backyard fence about which fertilizer she is using on her tomatoes, that's one kind of recommendation—a casual, personal recommendation. When you represent an institution of higher learning with a responsibility to the public, there is no such thing as a "casual" recommendation. For our purposes, a "recommendation" is a mention of the use of a particular agent in a particular way on a particular crop or site. By making a statement of this nature, we are vouching that the described use is (1) legal and (2) listed somewhere on a currently registered label.

Here at Washington State University (WSU), when a new or revised publication containing references to pesticides goes through our Publications Department or Cooperative Extension, these offices pass it along to the Pesticide Information Center (PIC) with a sign-off form. This applies to web pages as well as printed documents.

PIC staff reviews each publication for appropriate language, technical correctness (with respect to pesticides), and label conformance. We are particularly concerned with human health language (e.g., in matters concerning worker safety) and with environmental protection language (e.g., in matters concerning waste disposal, spray drift warnings, etc.) When appropriate, we consult Carol Ramsay (WSU's Pesticide Education Program coordinator) and/or members of Washington State Department of Agriculture's Registration and Compliance branches on wording.

Our office then checks the document for label conformance. We verify the crop or site, product trade name, active ingredient, package type (commercial vs. homeowner), rates, pests, timing, numbers and methods of application, pre-harvest intervals (PHIs), and re-entry intervals (REIs), matching up each recommendation with one or more federal and/or state-registered, labeled products. We make sure the registrations are current. In short, we ensure that every statement in the document about using a particular product is checked against a label. The only exceptions are those allowed under federal and Washington State law; if the document says to use less product than the labeled rate, if the document says to use the product less frequently than the label states, or if the document recommends product use on a pest not listed on the label, we do not instigate a change.

If our research fails to locate a label verifying the statements made in the publication, we call the author(s) and discuss the situation. If they are able to identify a label we missed, we obtain the label, verify it, and proceed with document approval. If no corroborating label is found, we ask the author(s) to modify the document so that any recommendations conform to a current label.

How does this review process benefit the author? One advantage to authors is legal protection. WSU is self-insured. If an author follows the review process and is sued, that author will be covered under WSU's insurance. If not…well, they're on their own.

The WSU administration feels that the PIC review function is important, and we continue to seek ways to improve it. Over the last eight years, we have begun keeping a record of our publication reviews as well as a record of the data used in approving or changing each publication submitted to us. This record includes the Environmental Protection Agency registration number, the company that registered the product, and the trade name of the label used in our verification process.

We were curious about how other states deal with recommendations and reviews. In an effort to better understand, we distributed a survey to our counterparts in Alaska, Arizona, California, Colorado, Guam, Hawaii, Idaho, Montana, Nebraska, Nevada, New Mexico, Oregon, Utah, and Wyoming. Of the fifteen contacted, eleven responded.

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Anatomy of a Recommendation, cont.

Dr. Catherine Daniels and Sally O'Neal Coates, Pesticide Information Center, WSU

Each institution provides materials to the public, which may include extension bulletins, fact sheets, manuals, handbooks, videos, and/or newsletters. Approximately half the states (AK, AZ, HI, UT, WY) plus Guam have no university policy or state law defining what constitutes a "pesticide recommendation;" the others (CA, ID, MT, NE, NV) define "pesticide recommendation" similarly to WSU: as a crop/chemical statement with use directions.

Four states (HI, ID, UT, WY) require no review process for publications containing pesticide references produced by their institution. Of those remaining, the periodic reviews required are conducted by peers (AZ, Guam, MT, NE, NV), the Pesticide Coordinator (CA, WA), or the Pesticide Applicator Training coordinator (AK). Most states treat home and garden product references in the same fashion as commercial references. A few (AK, CA, WA) go beyond legally mandated criteria when making homeowner-use recommendations, considering variables such as lack of personal protective equipment and waste-stream concerns when dealing with homeowners.

All U.S. state respondents have Master Gardener programs (Guam does not), and most Master Gardeners recommend pesticides when appropriate. Over half of these (AK, HI, MT, NE, UT, WY) have no policy as to limitations of Master Gardener recommendations, where others have specific limitations, deferring to university specialists or published guidelines.

All states and territories share a common concern for public safety. Due to Washington State law, we lean toward the conservative side when making recommendations, with substantial deference to regulations and policies designed with public health and safety in mind. Regardless of state or institutional regulations, university extension specialists throughout our survey regions consider the same factors when making recommendations:

- appropriate crop or site,
- effective rate of application,
- chemistry with the best fit for the job.

Dr. Catherine Daniels is the Pesticide Coordinator for WSU; Sally O'Neal Coates is an Editor of Research Publications. Either can be reached at WSU's Pesticide Information Center, (509) 372-7492, or individually via e-mail at ***cdaniels@tricity.wsu.edu*** *or* ***scoates@tricity.wsu.edu****.*

WaPCA Annual Meeting

The annual meeting of the Washington Pest Consultants Association is scheduled to be held:

November 16 and 17, 1999

Yakima Convention Center

Pre-registration is $65 ($75 on-site), and includes Tuesday lunch, annual dues, door prize eligibility, and a year's subscription to *AENews!* A complete agenda can be found on-line at

http://www.prosser.wsu.edu/Faculty/Bentley/wpca3.pdf

For further information, contact Ellen Bentley (509) 786-9271, Ginny Prest (509) 786-9215, or Russ Bowman (509) 952-8005.

Notice of Vacancy

FEQL Seeks Analytical Chemist

Washington State University

Description: Tenure track, twelve-month appointment, research/extension (80/20) position in the Department of Entomology. Assistant/associate professor rank; salary commensurate with experience and qualifications. Effective date July 2000.

General Information: The mission of the Food and Environmental Quality Lab (FEQL) is to (a) analyze pesticide residues in the environment and on crops, (b) investigate the environmental chemistry and toxicology of pesticides, and (c) provide environmental information about pesticides and pest control to the private and public sector. The FEQL analytical laboratory is located at the WSU Tri-Cities Branch Campus, and is one of several research and teaching laboratories. The facility is equipped with a benchtop GC-MS/MS, GC/LC-MS, and several GCs and HPLCs. There is also instrumentation for radiochemical and ELISA assays. The lab operates under a set of Standard Operating Procedures developed according to FIFRA GLP guidelines.

The successful applicant will be a team member of the FEQL Program and will work collaboratively with an environmental toxicologist, environmental/agrichemical education specialist, pesticide impact assessment program liaison, and pesticide education coordinator. FEQL team members collaborate with several state agencies, including agriculture, health, ecology, and labor. The person hired will work closely with the national and regional IR-4 programs and private laboratories. Interactions are encouraged with other faculty in the Department of Entomology as well as with crop protection specialists throughout the state, including those stationed at the WSU Research and Extension Centers in Prosser, Puyallup, Vancouver, Mt. Vernon and Wenatchee. Opportunities also exist for interactions with scientists at the Department of Energy's Battelle Pacific Northwest Laboratories in Richland.

Duties/Responsibilities: The person hired will develop a research program to study residues of agricultural chemicals in foods and the environment. In collaboration with IR-4, FEQL, and other WSU personnel, the successful candidate will be responsible for:

- developing analytical methods for detecting conventional, alternative, and biorational chemical residues in agricultural commodities and the environment;
- providing federal and state agencies and clientele groups residue data required for registration and re-registration of conventional, alternative, and biorational pesticides critical to crop production with emphasis on minor crops as part of the IR-4 program; and
- mentoring and supporting graduate student training.

The person hired will develop an extension program and be responsible for:

- providing outreach on issues related to agricultural chemical residues in foods and the environment to federal and state agencies, and agricultural commodity groups, food processors, and other clientele groups; and
- participating on the editorial board and contributing to *Agrichemical and Environmental News*, a monthly newsletter.

Education and Experience

Required Qualifications: A Doctorate Degree in analytical chemistry, biochemistry, environmental chemistry, or relevant field; knowledge and experience in the development of analytical methods and analysis of chemical residues in foods, especially pesticides; experience and ability to operate and maintain laboratory instrumentation, including gas and high pressure liquid chromatographs and bench-top mass spectrometry systems; demonstrated ability in written and oral communications; demonstrated ability to effectively interact with diverse clientele groups.

Desired Qualifications: Knowledge of FDA and EPA analytical methods and GLP regulations; ability to acquire external funding; familiarity with agricultural systems and food processing; experience with graduate student or intern training; experience in supervising personnel; experience working on team projects; ability to develop and meet timelines/deadlines; experience with handling producer and public concerns about pesticide-related issues; and experience with handling budgets.

Screening & Application: Screening of applications will begin November 15, 1999, and will continue until a suitable candidate is found. Submit a letter of application addressing specific required and desired qualifications and research interests, current transcripts and vitae, and have three letters of reference sent to Carol Ramsay, Chair, Analytical Chemist Search Committee, Department of Entomology, PO Box 646382, Washington State University, Pullman, WA 99164-6382; ramsay@wsu.edu, 509-335-5504, fax 509-335-1009.

WSU is an equal opportunity/affirmative action educator and employer. Members of ethnic minorities, women, Vietnam-era or disabled veterans, persons of disability and/or persons age 40 and over are encouraged to apply. WSU employs only U.S. citizens and lawfully authorized non-U.S. citizens. All new employees must show employment eligibility verification as required by the U.S. Immigration and Naturalization Service. Accommodations for applicants who qualify under the Americans with Disabilities Act are available upon request.

Organophosphates and the Risk Cup

Dr. Richard Fenske, Professor of Environmental Health, UW

"My cup runneth over" is a well-worn adage used to express good fortune or bounty, but in the language of today's regulatory world a full cup spells trouble for those who use pesticides. At least if that cup is a "risk cup."

The risk cup is the Environmental Protection Agency's (EPA's) conceptual approach to estimating total pesticide exposure and risk. EPA believes that about 80% of a typical U.S. citizen's pesticide intake occurs through food, and that the remaining 20% comes from drinking water and residential exposures. These fractions clearly differ from compound to compound, but for the organophosphate (OP) pesticides, this accurately characterizes EPA's current picture of the risk cup.

The Food Quality Protection Act (FQPA) of 1996 requires EPA to make sure that all exposure pathways are taken into account (a concept called "aggregate exposure"), and states that food tolerances must be reduced if the risk cup is too full. FQPA also charges EPA to determine the total or "cumulative risk" posed by the groups of pesticides with common mechanisms of action. Early on, EPA identified the OP pesticides as the first group to undergo this analysis. The specifics of how to calculate aggregate exposure and cumulative risk are still being debated hotly, but most everyone involved in pesticide regulation agrees that the OPs are vulnerable. It was no surprise, therefore, when in August EPA Administrator Carol Browner announced new restrictions on the use of methyl parathion and azinphos-methyl across the United States. Both are ranked in EPA's highest toxicity category (Toxicity I) due to acute toxicity concerns. Phosdrin and ethyl parathion, two other OP pesticides lost to agricultural use in recent years, fall in the same category. Each of these compounds attacks the nervous system of insects and humans alike, inhibiting cholinesterase, an essential enzyme.

Once upon a time we called these acutely toxic chemicals "economic poisons." This phrase may sound like an oxymoron in 1999, but in the earlier part of this century it was a practical term used commonly by entomologists and other scientists to describe chemicals that killed insects in agricultural production. Everyone who uses the more toxic OP pesticides today knows that they are inherently hazardous, and takes special care while handling them. Ingestion of OP pesticides remains one of the most common means of suicide in the world.

The first serious efforts to measure worker exposure to pesticides were prompted in large part by the introduction of OP pesticides into orchards of Washington State. The U.S. Public Health Service opened a laboratory in Wentachee in the early 1950s and began to document skin contact and absorption as a possible explanation for poisoning incidents that had previously been a mystery. Their work led to many of today's recommendations and requirements for pesticide applicator protection.

But why did Carol Browner point the finger at methyl parathion and azinphos-methyl? Do we really need further restrictions of OP pesticides? Maybe these are the wrong questions. If the question is, how do we best protect the health of the public, then EPA's recent action makes much more sense.

Reducing Total OP Pesticide Risk to Consumers

The EPA Administrator is obligated by law to reduce the total risk posed by OP pesticides across the United States. Congress set a stringent timeline for action. Her job is to make sure that the "risk cup" is never full for anyone, or at least not for 99.9% of the population (0.1% represents roughly 300,000 people). The simplest way to reduce total risk is to restrict use of the most toxic OP compounds. Thus, Toxicity I chemicals are the most likely targets for regulation, while Toxicity II compounds such as phosmet, malathion, and chlorpyrifos are likely to remain in use.

Reducing Workplace Hazards

The acutely toxic OP pesticides remain a hazard in the workplace. Workers who handle these chemicals are required to wear protective suits, gloves, boots, and respirators at all times, and field workers are

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OPs and the Risk Cup, cont.

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prohibited from entering treated fields for several days after application. The Bayer Corporation recently extended the restricted entry interval for azinphos-methyl to fourteen days in apples, presumably to reduce risks among agricultural reentry workers. The margin of error for working with some of these chemicals can be slim, as we learned with phosdrin use earlier in this decade. While the safety record for worker poisonings has improved here in the Northwest over the years, the use of Toxicity I chemicals will always require vigilance, and can never be considered risk-free.

Reducing Pesticide Use Worldwide

EPA is bound by a pledge to Congress in 1993 to reduce significantly the amount of pesticides used in the United States. EPA was joined in this commitment by the U.S. Department of Agriculture and the Food and Drug Administration. One result has been EPA's Pesticide Environmental Stewardship Program, which actively promotes integrated pest management (IPM). This emphasis on overall pesticide use reduction is part of a global trend. The Organization for Economic Cooperation and Development (OECD) has initiated a Pesticide Risk Reduction Project in partnership with the World Health Organization's Food and Agriculture Organization (FAO). And the European Commission is about to release the results of a 6-year study of pesticide use, along with recommendations for new strategies to reduce pesticide risks. These strategies will likely include reduced use of some pesticides. Thus, EPA's new restrictions should be viewed as part of an ongoing process among regulatory agencies in many countries to phase out some of the older pesticides, while encouraging new product development and alternative pest management approaches.

OP Pesticide Restrictions and the Media

Unlike the media reports in the days of Alar, most coverage of the new EPA restrictions stressed the safety of the nation's food supply. Reporters seem to have learned a lesson about creating unwarranted fears among consumers with alarmist messages. But it is also important to remember that these new restrictions are not really comparable to the Alar controversy at all. This is not just about apples, and the OP pesticides are nothing like Alar. (Alar is not acutely toxic, but was of concern because its breakdown product, UDMH, caused cancer in test animals.) Both methyl parathion and azinphos-methyl are used on a wide variety of fruit and vegetable crops. Prior to the new restrictions, approximately six million pounds of these chemicals were applied annually in the United States. The new restrictions are designed to eliminate some high-risk uses completely, but will allow many other uses to continue with modifications. In the case of apples, where the use of azinphos-methyl is deemed critical, producers are still allowed to apply nine pounds per acre, down from twelve pounds per acre. EPA's willingness to be flexible in developing these new restrictions shows a new sensitivity to the economic consequences of regulations.

This is not just about apples, and organophosphate pesticides are nothing like Alar.

The EPA has often been criticized for its regulatory decisions related to pesticides, and at times with good cause. In some past cases the logic behind the decisions has not always been apparent, but EPA's current procedures are characterized by a new openness and clarity. In the spring of 1998 EPA and the U.S. Department of Agriculture were called upon to create a public process that would allow all interested parties access to the science and reasoning used in decision making. Pesticide manufacturers and agricultural industry representatives have been permitted to scrutinize the smallest details of the process, and they have hired numerous scientific experts to assist them with this task. Risk assessments for methyl parathion and azinphos-methyl have been posted on the EPA website for review, and each step that EPA has taken has been debated in public

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OPs and the Risk Cup, cont.

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settings. While disagreements may remain about specific procedures or interpretations, the process has clearly been thoughtful, and was conducted in plain view.

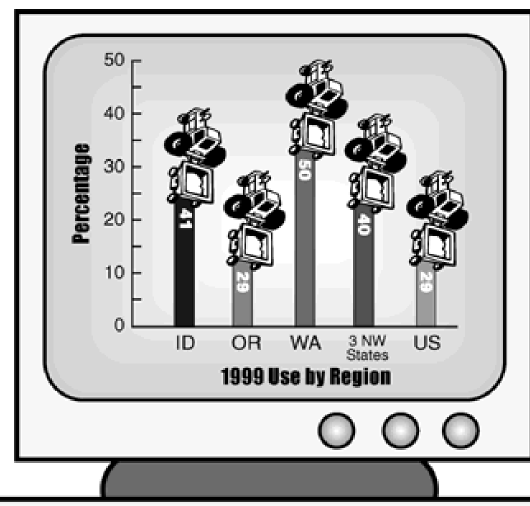
What is the future for other OP pesticides in light of EPA's obligation to reduce risks for consumers and workers? The creative efforts of many scientists are now focused on finding alternative pest control methods. As mentioned earlier, Washington State's apple growing regions were the site for many initial discoveries about OPs and health risks in the 1950s, and it appears that Washington may once again take a pioneering role by identifying innovative and practical pest control solutions. Washington State University recently received funding from the state legislature for twenty new faculty positions to support the state's new Safe Food Initiative. This initiative calls for increased research in biological control of pests in an effort to move away from dependence on chemicals. In public health, the central focus of research and education is prevention. Pesticide use reduction is one important way to reduce risk for workers and consumers alike. Ideally, USDA and EPA will work together to make pesticide use reduction practical and manageable for all concerned.

Dr. Richard Fenske is Professor of Environmental Health at the University of Washington's School of Public Health and Community Medicine, and Director of the Pacific Northwest Agricultural Safety and Health Center (PNASH). He also serves on EPA's Science Review Board, a congressionally mandated advisory board for pesticide science policy. He can be reached at ***rfenske@u.washington.edu*** *or (206) 616-1958.*

Clicking 'Til the Cows Come Home?

According to the *New York Times,* in an article dated August 20, 1999 (**http://www.nytimes.com/library/tech/99/08/biztech/articles/20farm.html),** farmers are using the Internet in record-breaking numbers. Citing a recent study by the National Agricultural Statistics Service, the article claimed that the percentage of agricultural producers connected to the World Wide Web more than doubled, from 13% to 29%, between 1997 and 1999. How and why do farmers use the 'Net?

- to check crop reports
- to check weather forecasts
- to check commodity prices
- seeking information on new crop varieties
- seeking information on chemical use and availability



Farmers Using the Internet

Source: Agricultural Statistics Board, USDA, July 1999
Chart Courtesy of Washington State University Information Department

Here in the Northwest, percentages are higher than the national average. Washington, reporting 50% Internet access, ranks second in the nation (NewJersey reports 53%), while Idaho reports 41% and Oregon, 29%. We are sure the vast majority of these savvy ag surfers are logging onto **http://picol.cahe.wsu.edu** regularly to check the Pesticide Information Center On-Line (PICOL) database and other fascinating and useful information gathered and reported by the PIC. Thanks to Tony Wright of Washington State University's College of Agriculture and Home Economics for bringing this news clip to our attention and to Terence Day for assisting with interpretation of data. See Day's related news release from the WSU College of Agriculture and Home Economics at **http://cahenews.wsu.edu/releases/99084.htm**, along with links to other on-line resources.

Implications of Buffer Zones on Agricultural Lands

Impacts on Beneficial and Pest Organisms

Dr. Doug Walsh, Agrichemical and Environmental Education Specialist, WSU

The endangered or threatened status of specific salmon populations could force the federal government to impose stiff regulations on land and water use in the Pacific Northwest. These imposed regulations, spawned from the Endangered Species Act, could impact land use on nearly seventy-five percent of Washington State. Additional regulations, precipitating from the Clean Water Act, could impact over 660 streams. Washington State forest product and agricultural industries sit squarely in the bull's-eye of increased regulation and hunting season could open any day now. Proactively, the Washington State Farm Bureau has pledged support for Governor Gary Locke's 1999 plan to promote the recovery of salmon populations (Johnson 1999). This plan calls for the establishment of riparian buffer zones and imposes limits on activities along streams. Which rivers and streams are chosen, how wide buffer zones must be, and which plants can be used in the buffer zones will affect future land use across Washington State.

Insects will likelyprosper in buffer zones, so we can expect a migration of both pest and beneficial arthropods from buffer zones into surrounding agricultural fields. Which pest or beneficial insects arise from buffer zones will depend largely on which plant species persist in the buffer zones.

Buffer Zone Geography

In Governor Locke's salmon recovery plan, riparian buffers will consist of outer and inner zones. The plan recognizes obvious differences in rainfall, vegetation, and land-use patterns between eastern and western Washington. In the agricultural regions of eastern Washington, the inner zone (i.e., zone closest to the water) will be either 75 feet (if the stream width is 15 feet or less) or 100 feet (if the stream or river width is greater than 15 feet).

The outer zone extends from the outside boundary of the inner zone a distance equivalent to the height of "the site potential tree." Sagebrush being the dominant "tree" in most eastside agricultural areas, the outer zone is negligible on agricultural lands.
The bottom line is that buffer zone size is rather specific to the plot of land affected. See *Do The Math* sidebar, below, for a sample calculation.

Politically Correct Plantings

Proposed streambank mitigation strategies promote the use of "native" plant species in riparian buffer zones. However, specific plant species are rarely suggested. Fortunately, my colleague Dr. Bob Stevens at Washington State University's (WSU's) Irrigated Agriculture Research and Extension Center (IAREC) was able to provide me with contacts to develop a list of twenty-eight plant species currently recommended for use in riparian habitats (Table 1).

Potential Pests

In natural ecosystems, plants generally persist in a state of relative homeostasis, i.e., in balance with their environment. Herbivores and diseases are prevalent but complex associations among the ecosystem's many inhabitants maintain community stability. These associations include interlocking food webs, extensive food partitioning, and co-evolution

Do The Math

Example calculation of buffer zone* size for an eastern Washington stream over 15 feet wide.

$$\frac{200\text{ ft.}^{1} \times 5280\text{ ft.}^{2}}{43{,}560\text{ sq. ft.}^{3}} = 24.24\text{ acres}$$

[1]100-foot buffer on each side x 2 = 200 linear feet
[2]5280 feet in a mile
[3]43,560 square feet in an acre

In other words, a mile-long stream in a square-mile (640-acre) farm could be cause for removal of over 24 acres, or about 4%, of the land from production.

*Note that this example calculates an "inner zone" only; "outer zones" in areas with predominantly low vegetation (e.g. sagebrush) are negligible.

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Buffer Zone Impacts, cont.

Dr. Doug Walsh, Agrichemical and Environmental Education Specialist, WSU

TABLE 1
Suggested riparian buffer zone plant species

Common Name	Latin Name
Willow	*Salix* spp.
Snowberry	*Symphoricarpus albus*
Vine maple	*Acer cicinatum*
Red-stem dogwood	*Cornus stolonifera*
Wild rose	*Rosa nutkana*
Oceanspray	*Holodiscus discolor*
Hardhack	*Spirea douglasii*
Evergreen blackberry	*Rubus laciniatus*
Hazelnut	*Corylus cornuta*
Tall Oregon grape	*Merberis aquifolium* or *Mahonia aquifolium*
Oregon myrtle	*Myrica californica*
Red elderberry	*Sambucus racemosa*
Ninebark	*Physocarpus capitatus*
Service berry	*Amelanchier florida*
Mock orange	*Philadelphus lewisii*
Snowbrush	*Ceanothus velutinus*
Huckleberry, blueberry	*Vaccinium parvifolium, V. ovatum, V. ovalifolium*
Hawthorn	*Crataegus douglasii*
Alder	*Aldus rubra*
Clematis	*Clematis* spp.
Sagebrush	*Artemisia* spp.
Bitter-brush	*Purshia tridentata*
Buckwheat	*Errigonium* spp.
Bluebunch wheatgrass	*Pseudoregneria spicata var. spicata*
Thickspike wheatgrass	*Elymus lanceolatus*
Basin wildrye	*Leymus cinereus*
Saltgrass	*Distichlis spicata*
Tall wheatgrass	*Elytregia elongata*

among plant, herbivore, carnivore, parasite, and pathogen (Walsh 1999). I doubt that a 200-foot riparian buffer zone strip winding though agricultural fields will achieve homeostasis.

Armed with a working list of twenty-eight plant types or species, I was able to review the literature and consult several WSU experts for associated arthropod, weed, and viral pests. Tables 2, 3, and 4 list pests that might pose a risk to crops if any of the recommended native plant species occur in the managed buffer zones.

Arthropod Pests (Table 2)

Many insect pests use native plants as alternate hosts. For example, the pollen produced by willows is nutritious to a variety of pest moths and beetles and snowberry is an alternative host for apple maggots.

Viral Pests (Table 3)

Virulence of plant viruses can vary; in fact, most are innocuous in nature. However, some viruses are damaging. Often viruses are vectored from plant to plant by insects.

Weed Pests (Table 4)

The Random House dictionary defines a weed as “a valueless, troublesome, or noxious plant growing wild, especially one that grows profusely to the exclusion or injury of the desired crop.” Most damaging weeds in Washington State are of old-world origin. Freed from the herbivores and diseases of their native habitats, these plants spread rapidly and many have gained habitat dominance in the Pacific Northwest. It is unlikely that “native” plants will persist and out-compete naturalized weed species in buffer zones.

Well, Now, Let’s Just Go Take a Look

Just east of Prosser, near IAREC, the Benton County Conservation District has rehabilitated a stream bank with perennial bunchgrasses. My fellow entomologist Ron Wight and I visited the site on September 16, 1999. The stream bank looked beautiful, with bunchgrasses filling most of the bank within about twenty-five feet of the five-foot-wide stream. However, interspersed near the stream bank and increasing in prevalence to become the dominant plant was the fairly recently introduced (about twenty years ago) exotic weed species *Kochia scoparia* L.
We sampled the insect fauna using a sweep net. The

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Buffer Zone Impacts, cont.

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dominant insect species present was *Lygus hesperus* Knight. Lygus bugs are a native insect pest that have readily shifted to many crop plants as they have been introduced. Biological control strategies against Lygus have for the most part failed, in my opinion. Buffer zones could potentially become reservoirs for generalist pests like Lygus.

TABLE 2
Potential arthropod pests associated with host plants listed in Table 1.

Plant	Potential Arthropod Pest
Willow	Pollen can serve as a food source for adult corn earworm, cabbage looper, celery looper, and other lepidoptera (Lingren et al. 1993). Beetles that are also potential pests include *Chrysomela vigintipunctata* larvae, ovoviviparous leaf beetle *Gonioctena sibirica, Disonycha pluriligata, Euura amerinae* L.
Snowberry	Alternative host for apple maggot *Rhagoletis pomonella*.
Vine maple	Alternative host for pear thrips.
Red-stem dogwood	Alternative host for *Rhagoletis tabellaria*, a sibling species of apple maggot (Smith 1985).
Wild rose	Alternative host for western tent caterpillars *Malacosoma californicum* (Myers 1981) and miscellaneous pest mites.
Hardhack	Alternative host for apple and spirea aphids (Mayer and Lunden 1996).
Evergreen blackberry	Alternative host for orange tortrix (Coop et al. 1989).
Hazelnut	Host for the hazelnut weevil *Curculio obtusus* (Treadwell 1996).
Mock orange	Host for the oblique banded leafroller (Carriere and Roitberg 1995).
Huckleberry, blueberry	Host for apple maggot *Rhagoletis pomonella* (Messina 1989).
Hawthorn	Host for apple maggot *Rhagoletis pomonella* (Messina 1989, Jones et al. 1989).
Bitter-brush	Host for the western tent caterpillar (Mitchell 1990) and the walnut span worm (Furniss and Van Epps 1981).
Thickspike wheatgrass	Potential host for minor aphid pests; host for Russian wheat aphid (Messina et al. 1993).
Saltgrass	Leaf hopper host (Rossi et al. 1996).

The good news is that our sweep net samples also contained many generalist insect predators. These beneficial insects included several species of coccinelids (i.e., Ladybird beetles), hemipterans (damsel, big-eyed bugs, and minute pirate bugs), neuropterans (brown lacewings), and dipterans (syrphid flower flies). We also observed several species of braconid and ichneumonid parisitoid wasps.

Large areas of untreated land adjacent to an agricultural field should enhance the survival of beneficial predatory or parasitic arthropods. Another potential beneficial side effect of riparian zones is the presence of untreated refuges that allow survival of pesticide-susceptible pest insects. These insects could breed with potentially pesticide-resistant insects and help keep pest populations susceptible.

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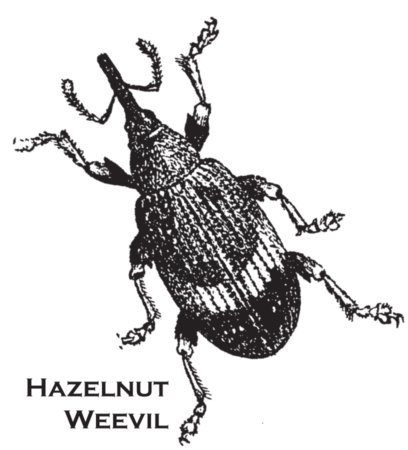

HAZELNUT WEEVIL

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Buffer Zone Impacts, cont.

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Public Health

Mosquito larvae develop as juveniles in aquatic habitats. The Benton County Mosquito Abatement District reports that the dominant mosquito species in Eastern Washington is *Culex tarsalis* Coquillet, referred to as "treehole mosquitoes." Their larvae develop in small stagnant bodies of water. Correspondingly, *Culex* mosquito populations will not be reduced by a greater abundance of healthy and hungry fish in clean running waters. Additionally, adult mosquitoes require nourishment from a sugar source. Typically this is acquired from nectar from a floral or extra-floral source. Mosquitoes also require shelter from the elements and predators. Riparian habitats provide both food and shelter for mosquitoes. Recent research from rice-growing regions in California has demonstrated that riparian habitats contain the greatest abundance of adult female (i.e. biting) *Culex* mosquitoes (Wakesa 1996). A broad increase in acreage devoted to riparian habitats could lead to greater populations of *Culex* mosquitoes. *Culex* is the primary vector of western equine encephalomyelitis and St. Louis encephalitis (Reeves et al. 1994).

Pesticide Use in Riparian Zones

The Governor's salmon recovery plan states, "The use of pesticides will be managed to meet water quality standards and label requirements and to avoid harm to riparian vegetation." With few exceptions, pesticide application will be prohibited in buffer zones. Specific exemptions are targeted towards satisfying local noxious weed control issues. Exceptions for agricultural or public health arthropod pests are not mentioned.

Conclusions

How the imposition of long, narrow tracts of land planted in native and naturalized weedy plant species will effect beneficial and pest arthropod abundance is yet to be determined. From experience, I think it will lead to greater populations of Lygus bug and other generalist pests. However, I believe that it will lead to greater populations of beneficial arthropods as well. The waters are muddy (pun intended), but I have no doubt that it will certainly prove to be a challenging and interesting time to study entomology.

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TABLE 3
Potential virus pests associated with host plants listed in Table 1

Plant	Potential Viral Pests
Willow	Potential host for Brome mosaic bromovirus,Tomato mosaic tobamovirus, Tobacco necrosis necrovirus (Kopp et al. 1999).
Red-stem dogwood	Dogwood species are known to host cherry leafroll virus, a pollen-transmitted virus.
Wild rose	Likely host for apple mosaic virus, *Prunus* necrotic ringspot virus, *Arabis* mosaic virus and tobacco streak virus. These viruses are endemic with the exception of ArMV, so would not have a large impact. Depending on the status of ArMV (surveys currently in progress), this could be an important host.
Evergreen blackberry	Blackberry species are host to cherry leafroll virus, tomato blackring virus, tomato ringspot virus and raspberry leafcurl virus. All of these can infect agricultural crops. CLRV, TBRV and ToRSV are nepoviruses presumably pollen-borne, seed transmitted and likely nematode transmitted, so potential for persistence in soil exists.
Red elderberry	Host to cherry leafroll virus.
Hawthorn	It is currently thought that Pierce's disease could not exist in central Washington. There may be a disease potential along the coast. Presently PD is limited to the south. However, hawthorn is a host of apple chlorotic leafspot virus and apple stem pitting virus (no known vector, so of limited importance). Suspected host of cherry twisted leaf (aka apricot ringpox virus). These viruses move in from wild vegetation and within the orchard, but vector or other mechanism of transmission unknown.

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Buffer Zone Impacts, cont.

Dr. Doug Walsh, Agrichemical and Environmental Education Specialist, WSU

Author's Note

Contributions of information from WSU professors Bob Parker (weeds), Keith Pike (insects), and Ken Eastwell (pathogens) were invaluable in synthesizing the information for this essay.

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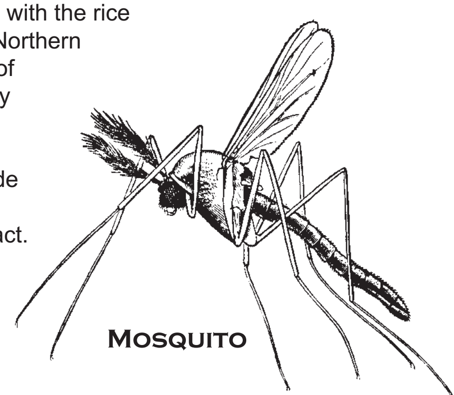
TABLE 4 Potentially weedy plants
Willow
Snowberry
Sagebrush
Buckwheat
Saltgrass



Mosquito

Boffo Buffer Zones

How Big Is Big Enough?

Dr. Allan S. Felsot, Environmental Toxicologist, WSU

"Conventional agriculture must be replaced with sustainable agriculture." How many times have you heard such statements uttered by politicians and policy makers who talk about sustainability as if it were an immediately available off-the-rack technology? Such a myopic perspective doesn't consider that today's seemingly sustainable practices may not be functional as tomorrow's technology.

Technology constantly evolves as we experiment by trial and error to discover how sustenance can be provided without messing up our own nest. Long before every technology and development policy was adorned with the imprimatur of "sustainable," agricultural scientists studied efficient and safe technologies for food production, knowing that soil and water quality was vital to crop production. Agricultural producers embrace these evolving technologies, known as best management practices, or BMPs, to meet societal expectations of cheap food and environmental stewardship.

...today's seemingly sustainable practices may not be functional as tomorrow's technology.

BMPs Are Tools of Environmental Stewardship

During the past quarter century, the most-visible BMPs have been those developed to protect water resources from excessive contamination by eroded soil, fertilizer nutrients, and pesticide residues. BMPs for reducing agrochemical movement have focused on both the application process itself and the post-application losses. Historically, BMPs were developed mostly for in-field practices, either minimizing drift or reducing soil erosion and water runoff. More recently, the focus has shifted to include areas adjacent to and "downstream" of the field.

Buffer Zones Are BMPs

Buffer zones around agricultural lands have been proposed as effective "structures" for protecting adjacent sensitive aquatic and terrestrial habitats. Indeed, the Washington Farm Bureau strongly recommends that growers voluntarily develop buffer zones around or on their lands to protect streams with potential salmon-bearing habitat (Johnson 1999).

Buffer zones have value well beyond the protection of water quality and aquatic organisms. Buffer zone development can be a BMP for protecting sensitive nontarget crops or native plants. Our region grows a bewildering variety of crops in a mosaic pattern. The use of a herbicide in a tolerant crop growing in one field may be detrimental to a susceptible crop planted nearby. Conflicts between wheat and grape growers are legendary, as grapes are notoriously sensitive to the herbicide 2,4-D.

As suburban communities spread out onto former agricultural land, buffer zones can also help reduce conflicts between homeowners and growers due to noise, dust, odors, and pesticide drift.

Buffer Zones Defined for Pesticide Management

The Commission on Agrochemicals and the Environment of the International Union of Pure and Applied Chemistry has recommended the following definition for buffer zone (Holland 1996): "Distance for environmental protection between the edge of an area where pesticide application is permitted and a sensitive non-target area, e.g., water course." By this definition, the buffer zone starts at the edge of the last swath of pesticide spray, but does not necessarily include only land outside of the growing crop. A grower could make the decision to not treat several outside rows of his crop, effectively allowing his cropland to be part of a buffer.

Depending on what one is trying to protect, buffer zones could be temporary or permanent spaces. If one was trying to avoid damaging an adjacent sensi-

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Boffo Buffers, cont.

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tive crop during application, leaving some unsprayed rows might suffice, but other agricultural practices (for example, soil management practices) would not be restricted. If reduction of the effects of water runoff or erosion is the objective, a buffer zone around a field would essentially need to be permanent as agrochemical runoff can occur long after application.

How Big Is Big Enough?

There has not been sufficient research reported to determine the relationship between the size of a buffer zone and its effectiveness in controlling runoff and erosion. Available research has tended to focus on types of plants that might be best for either absorbing excessive nutrients at the edge of a field or for filtering out sediment during a rainstorm.

Buffer zone size has usually been studied in relation to management of spray drift. Choosing a buffer zone size is easy when size is mandated by regulation. For example, the Forest Practice Rules in Washington prohibit any spraying within fifty feet of a riparian management zone (RMZ). RMZs are natural landforms consisting of vegetation (grasses, bushes, trees) lying adjacent to rivers and streams, whether ephemeral or permanent. While RMZs potentially reduce spray drift, they are not necessarily going to stop runoff, especially when streams meander through a treated area. Whether fifty feet is adequate to stop spray drift into streams was questioned several years ago by the Washington Department of Ecology and resulted in a proposal to increase the length by nearly fivefold (Rashin and Graber 1993).

...there is no one-size-fits-all answer...

Obviously, there is no one-size-fits-all answer for how big a buffer zone should be to effectively reduce the impact of spray drift. What is needed is a strategic plan that can customize the buffer zone for a particular situation. Such a strategic plan incorporates four elements: physical laws of particle movement, nature of the habitat outside the treated area, toxicological responses of the organisms to be protected, and a graphical synthesis of the first three elements.

Buffer Zone Physics

The objective of a buffer zone, whether permanent or temporary, is to eliminate adverse effects outside of a field or forest plantation. Given the fundamental physical laws of chemical movement, buffer zones developed for pesticide management are unlikely to completely eliminate residues outside the treated field. However, buffer zones can effectively reduce exposure of sensitive organisms by taking advantage of fundamental laws of physics. What goes up, must come down. And the heavier something is, the sooner it must fall.

Regardless of what pesticide is used, spraying creates tiny droplets (particles) that are pushed around by air currents. The heavier, bigger particles fall to the ground very quickly and never leave the field. The lightest, smallest particles move great distances, but become less concentrated (i.e., more dispersed) the longer they stay airborne and thus, less likely to cause harm when they eventually fall to the ground. Of more concern are the particles adequately sized to move just beyond the field boundary and fall on bodies of water, sensitive crops, or someone's house. The buffer zone must be big enough so that when the particles come down, there are not enough of them to adversely affect anything beyond the buffer zone.

Because spray drift is controlled primarily by particle sizes emanating from the nozzles and secondarily by factors like wind and sprayer type, mathematical models can simulate many spray scenarios. One such model, AgDRIFT, has been constructed by the agricultural chemical industry in cooperation with the Environmental Protection Agency (EPA) (Teske 1997). The output of this model can be graphed as the relationship between the amount of a spray that drifts and distance to deposition (Figure 1).

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Boffo Buffers, cont.

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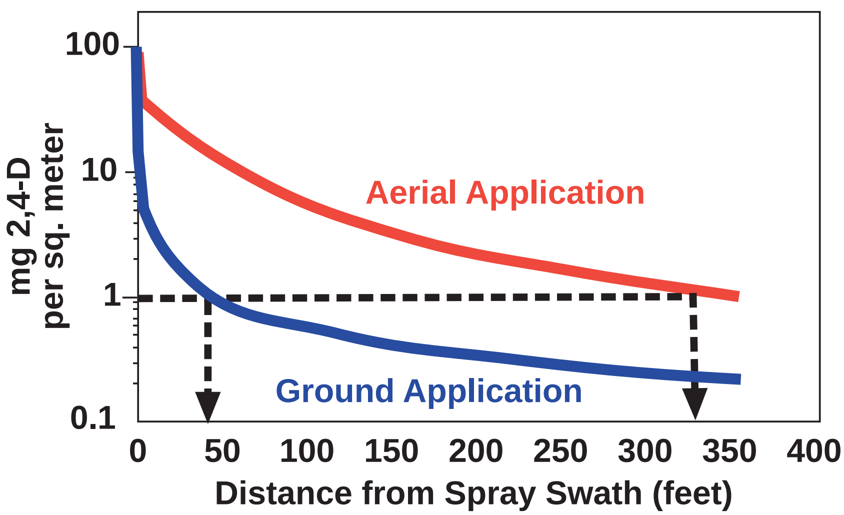
FIGURE 1

Distribution of drift via aerial and ground application methods and estimated maximum buffer lengths required for protection of grapes.



Drift of 2,4-D estimated using the model AgDRIFT. The model assumes 20 spray swaths were made and a 10-mph wind was blowing toward the vineyard. The buffer zones are indicated by the dashed arrows for an application by ground sprayer and helicopter.

Toxicological Benchmarks

The third factor needed to design an adequately protective buffer zone is knowledge of what pesticides can be used and the sensitivity of the organisms that need to be protected. The identity of the pesticides and any nearby sensitive crops or residential neighborhoods can be easily determined. More difficult to predict are the myriad of aquatic organisms in an adjacent stream.

The most conservative strategy, which is favored by the EPA for ecological risk assessments, is to use the response of the most sensitive organism in short-term (four days or less) toxicity tests. These tests provide the acute LC_{50}, or the concentration of a substance in water that kills 50% of the organisms. For protection of humans, the strategy is to find the lowest dose, commonly called the no observable effect level (NOEL), not causing any type of adverse effect in 90-day feeding tests with rats, mice, or dogs.

Nature of the Habitat

The concentration of the spray particles that fall just outside the buffer zone will depend on structures within the buffer zone. For example, hedges and trees can intercept spray droplets, effectively reducing their numbers before they exit the buffer zone. If water is to be protected, the nature of the water body is a factor. For example, a fixed number of spray particles falling in moving, deep water will result in less pesticide concentration than the same number falling on stagnant, shallow water. The resulting concentration in the receiving waters is important because "dose makes the poison." Or as one skeptic I know put it, "dilution is the solution to pollution."

Once these toxicity benchmarks are determined, they can be further divided by a safety factor, resulting in a level of exposure that is reasonably certain to be without harm. For humans, the resulting tolerable dose is called the acute reference dose (RfD), usually obtained by dividing the NOEL by 100. For aquatic organisms, the EPA uses a risk quotient approach. For example, for endangered species, the estimated environmental concentration must be at least twenty times less than the acute LC_{50} of the most sensitive test organism. The other possible benchmark for aquatic organisms is to use a statistically derived guideline (known as the ambient water quality criterion) that is based on numerous species tests.

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Boffo Buffers, cont.

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All Together Now

At this point in the planning process, one has determined the spray drift potential, characterized the habitat needing protection, and determined the appropriate toxicological benchmark. The next step melds everything together to determine how far from the sprayed area a stream, sensitive crop, or person has to be before drifting particles are sufficiently dilute to cause no exposure beyond the safety guidelines. This distance defines the linear dimensions of the buffer zone.

Let's illustrate the process in a case study, using the herbicide 2,4-D as the subject. Say we want to protect a stream next to an irrigated wheat field. On the other side of the stream is a new housing development and a vineyard. The grower plans to hire a helicopter to spray the field with a formulation of 2,4-D at a rate of two pints per acre. A consultant is asked to determine what size buffer zone is needed to avoid the possibility of any harm to the adjacent nontarget areas. The consultant also determines how this buffer zone might differ if the 2,4-D was applied from a ground sprayer.

...as one skeptic put it, "dilution is the solution to pollution."

Using the AgDRIFT simulation model, we can predict how much drift will occur at various distances downwind of the last spray swath. The amount of drift depositing can be expressed either as a percentage of the application rate or as an actual weight of pesticide per unit of area (for example, milligrams of pesticide per square meter, mg/m^2). The relationship between pesticide deposition and distance from the spray swath is graphically displayed as a curve (Figure 1). The model does not account for vegetation in the buffer zone that might intercept spray particles. Furthermore, the model incorporates wind blowing at 10 miles per hour directly toward the areas needing protection.

The RfD of 2,4-D for a 10-kilogram child is 0.1 milligrams per day. This whole-body dose can be mathematically transformed to a body surface area dose using EPA exposure parameters (EPA-ORD 1997) and assuming very conservatively that a kid's entire body might be exposed to drift. For example, a two- to three-year-old child has a total body surface area of 0.682 m^2 (although, realistically, only the arms, legs, and head would likely be exposed). Studies with humans exposed to 2,4-D have shown that less than 10% of the dermal dose can penetrate the outer skin. Thus, the "safe" dose can be multiplied by a factor of ten because for every ten milligrams of 2,4-D that falls on the skin, only one mg will actually enter the body. The resulting toxicological benchmark expressed on a unit area basis is 1.5 mg/m^2 (Table 1).

For protection of aquatic organisms, the U.S. Geological Survey uses an ambient water quality criterion of 0.004 milligram per liter (mg/L, which is 4 parts per billion, ppb). If the stream were 1 meter (m) deep, then the benchmark concentration not to be exceeded would translate to 4 mg/m^2.

No standard safety criteria have been developed for sensitive crops. However, one can often find a study in the literature that is applicable to the situation of concern. Fortunately, a number of herbicides have been tested with grapes to determine the lowest dose that can cause visible injury. A study at Washington State University showed that 2,4-D deposition below 1.1 mg/m^2 should not harm wine grapes (Al Khatib et al. 1993).

Using the graph generated by AgDRIFT, the maximum buffer zone length can be determined by drawing a horizontal line from the deposition axis to the drift curve, and then dropping a perpendicular line to the distance axis. For example, a horizontal line

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Boffo Buffers, cont.

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drawn from the grape toxicity benchmark of 1.1 mg/m^2 to the curve for ground and aerial spraying yields buffer zones of 40 and 335 feet, respectively (Figure 1, Table 1). A similar process is used to derive the buffer zones needed to adequately protect aquatic organisms and children (Table 1). A shorter buffer zone can be delineated for ground spraying because spray is released much closer to the ground from a tractor than from a helicopter; the spray particles tend to be bigger, so they deposit sooner.

TABLE 1
Exposure objectives and buffer zone lengths estimated for protection of habitats from a ground and aerial application of 2,4-D at 2 pints per acre.

Habitat Requiring Protection	Toxicological Benchmark for Tolerable Exposure	Estimated Buffer Zone Length (Ground Spray)	Estimated Buffer Zone Length (Aerial Spray)
Stream	4.0*	7 ft.	125 ft.
Vineyard	1.1*	40 ft.	335 ft.
Residence	1.5*	26 ft.	270 ft.

***Milligrams of 2,4-D per square meter of surface area.**

CALCULATIONS USED TO DERIVE BENCHMARKSS

STREAM: 1 liter is 0.001 m^3; dividing 0.001 m^3 by a 1 m depth yields 0.001 m^2; 0.004 mg (the USGS criterion) divided by 0.001 m^2 yields 4 mg/m^2. VINEYARD: Grapes are not adversely affected by 2,4-D deposition less than 1% of the application rate or about 11.2 grams per hectare; there are 10,000 m^2 in a hectare, so 11,200 mg/10,000 m^2 yields 1.1 mg/m^2. RESIDENCE: RfD for 2,4-D is 0.01 mg/kg/day which is 0.1 mg/day for a 10 kg child; if only 10% of the dose landing on skin is absorbed, the "safe" dose is 1 mg/day; 1 mg divided by a body surface area of 0.682 m^2 yields a surface dose of 1.5 mg/m^2.

But... Is It Sustainable?

The estimated buffer zones don't guarantee there will be no pesticide exposure. They only estimate, under worst-case conditions, the most conservative buffer zone lengths that could provide a reasonable certainty of no harm, which is how the Food Quality Protection Act (FQPA) defines safety. Whether buffer zones represent a BMP that will be considered sustainable years from now is indeterminate. BMPs are necessarily developed in the context of desired societal goals, and therefore are subject to modification. Based on what we know after many millions of dollars of pesticide testing, the germane question should be whether reasonable certainty of no harm is safe enough.

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Pesticide Applicator Training Courses

Washington State University offers PRE-LICENSE courses (for those who do not have a license and need one) and RECERTIFICATION courses (for those who need to renew their current licenses). Fees are $35 per day if postmarked 14 days before the program, otherwise $50 per day. This fee DOES NOT include WSDA license test fee, which ranges from $25 to $170; for information on testing and fees, contact WSDA at (360) 902-2020 or http://www.wa.gov/agr/test/pmd/licensing/index.htm. Recertification courses offer 6 credits per day. FOR MORE INFORMATION or REGISTRATION: (509) 335-2830, pest@cahe.wsu.edu or http://pep.wsu.edu.

2000 Recertification Courses		2000 Pre-License Courses	
Eastern Washington	**Western Washington**	**Eastern Washington**	**Western Washington**
Pasco, Doubletree Inn Jan 12 & 13	Vancouver, WSU Campus Jan 5 & 6	Pasco, Doubletree Inn Jan 11, 12, 13	Vancouver, WSU Campus Jan 4, 5, 6
Yakima, Convention Center Jan 20 & 21	Tacoma South Park Community Center Jan 12 & 13	Yakima, Convention Center Jan 19, 20, 21	Tacoma South Park Community Center Jan 11, 12, 13
Pullman Moscow (ID) University Inn Jan 25 & 26	Lynnwood Edmonds Community College Jan 20 & 21	Pullman Moscow (ID) University Inn Jan 24, 25, 26	Lacey Lacey Community Center Jan 31, Feb 1, 2
Moses Lake, Elks Club Jan 27 & 28	Port Orchard Givens Community Center Jan 26 & 27	Wenatchee, Doubletree Inn Jan 31, Feb 1, 2	Mount Vernon, Cottontree Inn Feb 8, 9, 10
Wenatchee, Doubletree Inn Feb 1 & 2	Lacey, St. Martins College Jan 31 & Feb 1	Spokane Spokane Valley Doubletree Inn Feb 15, 16, 17	Kirkland Lake Wash. Technical College Feb 15, 16, 17
Spokane Agricultural Spokane Valley Doubletree Inn Feb 14	Highline Community College Feb 3 & 4	Spokane Agricultural Private Applicator License Spokane Valley Doubletree Inn Mar 25	Tacoma Pacific Lutheran University Feb 29, Mar 1, 2
Spokane Spokane Valley Doubletree Inn Feb 16 & 17	Mount Vernon, Cottontree Inn Feb 9 & 10		Tacoma Aquatics Pacific Lutheran University Mar 1
DEALER MANAGER RECERTIFICATION COURSE **—EASTERN WA—** Colfax Community Education & Training Center Jan 14 Moses Lake Elks Club Jan 18 **—WESTERN WA—** Puyallup WSU Feb 15	Kirkland Lake Wash. Technical College Feb 16 & 17	**INTEGRATED PLANT HEALTH MANAGEMENT** Puyallup, Jan 25-27 3 days, 15 credits, $150	Puyallup, WSU Campus Mar 28, 29, 30
	Tacoma Pacific Lutheran University Mar 1 & 2		Puyallup, WSU Campus Apr 4, 11, 18, 25 (Special 4-day course)
	Seattle University of Washington Mar 16 & 17		

...and, for those of you who need your recertification training in 1999...

1999 "LAST CHANCE" RECERTIFICATION COURSES

Pasco Nov. 1 & 2 • Pasco Español Nov. 2
Pasco Doubletree Inn

Lynnwood Nov. 15 & 16
Edmonds Community College

The Future of SLN Registrations

Steve L. Foss, Pesticide Information and Resource Specialist, WSDA

The Washington State Department of Agriculture (WSDA) currently maintains approximately 320 Special Local Need (SLN) registrations for over forty-five minor crops. SLNs are issued by states to address local pest problems when a federally registered pesticide is not available for the given use. About one-fifth of the SLN registrations in Washington are for organophosphate (OP) insecticides. Tolerance reviews for OPs, along with those for carbamates and B2 (potentially carcinogenic) chemicals, are among the top priorities for the U.S. Environmental Protection Agency (EPA) in the implementation of the 1996 Food Quality Protection Act (FQPA). With these chemistries under such scrutiny, Washington State growers are concerned about what pesticides will be available in the future.

This past summer EPA announced regulatory changes for two OPs, methyl parathion and azinphos-methyl (see related articles in *AENews* Issue 161, September 1999). These actions should not have a great direct impact on SLNs, but a rapid change from an OP-based program to an Integrated Pest Management (IPM) program utilizing a wider range of other insecticides could result in secondary pest outbreaks and the overall use of more insecticides (Whalon et. al., 1999). Registrants are currently required to cancel all methyl parathion SLNs, but may reapply for new registrations for the specific uses that have been retained, such as dried peas and lentils. EPA will conduct risk assessments on more than thirty other OPs over the next year and a half, which will likely lead to changes in other crop SLNs. Table 1 shows review schedule for the thirteen OPs directly related to Washington State SLNs.

It is thought that EPA will schedule risk evaluation for carbamates in late 2000. Meanwhile, EPA will review the human and environmental effects of older insecticides to ensure they meet current standards, possibly leading to further SLN changes. For example, the SLN registration for use of iprodione (Rovral) on crucifer seed crops will change due to the removal of application by air. EPA requested this revision to mitigate risk as outlined in the Reregistration Eligibility Decision (RED) document for iprodione. Electronic copies of REDs are available on the Internet **(http://www.epa.gov/docs/oppsrrd1/REDs/index.html)**.

As chemical registrants decide which pesticide registrations to maintain, it is likely that minor crops will initially suffer the most losses (Evans, 1998), since there is little or no incentive to develop or maintain these uses (Bischoff, 1993). (Also see article, “IR-4: Developing and Delivering Solutions for Minor Crop Producers,” in *AE-News* Issue 162, October 1999.) In the case of apples, Washington’s growers must now depend upon less effective and more expensive pest management systems due to the loss of methyl parathion and reduced use rates allowed for azinphos-methyl (Brunner 1999). Alteration of a tolerance during the reassessment process may affect 24(c) registrations by limiting the rate, timing, number, and/or method of pesticide applications. Elimination of tolerances would lead to a reduction in the number of SLNs.

Trends in Washington SLNs

The total number of SLN registrations issued has dropped by approximately eighteen percent during the past three years (based on 132 SLNs from 1994 through 1996 compared to 108 from 1997 through 1999). During the same periods, WSDA also issued a lower number of SLNs for food uses (81 from 1994 through 1996 compared to 63 from 1997 through 1999). While total SLN registrations are down, Washington has seen a surge in the number of SLNs issued for seed

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Future of SLNs, cont.

Steve L. Foss, Pesticide Information and Resource Specialist, WSDA

crops in the period from 1997 through 1999. Seed crop registrations accounted for about thirty percent of the total number in the last three years, compared to eighteen percent from 1994 through 1996.

For Further Information

Information on Pesticide Registration in Washington may be obtained on the Internet at **http://www.wa.gov/agr/**.

If you have questions on WSDA pesticide registration procedures, you can e-mail the WSDA Pesticide Registration Section at **pestreg@agr.wa.gov**, call (360) 902-2030, or fax (360) 902-2093.

The proposed schedule for review of OPs can be found on the Internet at **http://www.epa.gov/pesticides/op/actionops.htm** and the priority list of carbamates and B2s scheduled to undergo EPA tolerance review is available at **http://www.cast-science.org/fqp1_t1.htm**.

Steve Foss is a Pesticide Information and Resource Specialist with Washington State Department of Agriculture. He can be reached at ***sfoss@agr.wa.gov*** *or (360) 902-2049.*

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Bischoff, R.F. 1993. Pesticide chemicals: An industry perspective on minor crop uses. p. 662-664. In: J. Janick and J.E. Simon (eds.), New crops. Wiley, New York.

Brunner, J.F. 1999. Response to EPA Action – Methyl Parathion and Azinphos-Methyl Loss Will Impact Tree Fruit Industry. Agrichemical and Environmental News (Sept.) 161:1–3.

Evans, R.R. 1998. FQPA could hurt pesticide registrations. Ag-Alert. March 4.

Whalon, M.E., B.J. Jacobson, S.D. Rawlins, D. Ricks, and S.M. Swinton. 1999. Agricultural Impact of the Sudden Elimination of Key Pesticides under the Food Quality Protection Act. Council for Agricultural Science and Technology (CAST) - Issue Paper No. 11 (**http://www.cast-science.org/fqp1_ip.htm**)

TABLE 1
EPA's Review Schedule for OPs as Relates to SLNs in Washington

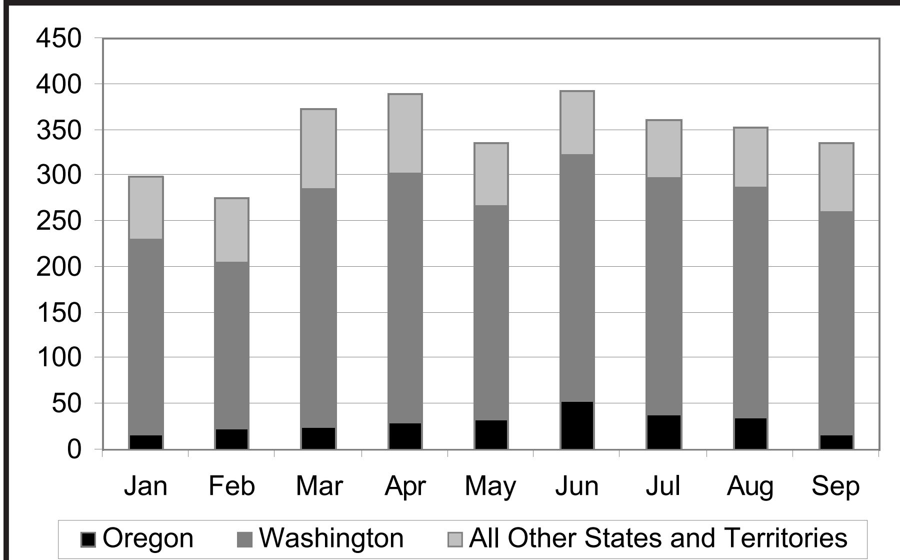
EPA's Review Dates	Active Ingredient	# WA SLNs	Crops / Sites
August 1999	methyl parathion	3	lentil, pea
August-September 1999	fenamiphos	1	bulb
	methidathion	4	timothy, timothy/alfalfa (hay and forage)
	naled	3	alfalfa seed crop, hop
	phorate	3	potato, radish seed crop
October-December 1999	acephate	5	carrot seed crop, cranberry, radish seed crop, sweet grain lupines
	dimethoate	16	cherries, grape, lentil, pea, phragmites reed beds, tree pulp production
	disulfoton	6	asparagus, clover seed crop, potato, radish seed crop, wheat, barley
	oxydemeton-methyl	5	Christmas tree plantation, filbert, forest nursery, mint, strawberry
	phosmet	3	blueberry
April-June 2000	chlorpyrifos	5	carrot seed crop, grape, grass seed crop, strawberry, tree pulp production
	malathion	1	cottonwood trees
July-Sept. 2000	diazinon	5	apple, cranberry, grape, pear

PICOL: Dilly of a Database
How Do I Use Thee? Let Me Count the Hits

Jane M. Thomas, Pesticide Notification Network Coordinator

In the Pesticide Information Center (PIC), we spend a great deal of time reading pesticide labels. Then we translate that label information into computer codes and enter it as data. The end result of these efforts is the PICOL (Pesticide Information Center On-Line, pronounced “pickle”) label database, accessed from the PICOL main page at **http://picol.cahe.wsu.edu/**.

TABLE 1 - 1999 PICOL Label Database
Use by Region



For those of you who aren’t familiar with PICOL, the label database is a (free) searchable pesticide database that tracks which pesticides are registered for use in Oregon and Washington. The database is a veritable fount of knowledge and can tell you, among other things, what products are labeled for use on which crop and pest combinations. (Did I mention there is no charge for using this database?) If you want to know the active ingredient in a product or which products containing that same active ingredient are registered for use, the database can help (at no cost). Want to know what fungicides are labeled for use on rhubarb? How about a list of imidacloprid-containing insecticides? OK, you really want a list of herbicides labeled for use on kiwifruit, registered by Dow, whose product names start with “Q.” The PICOL label database is the place to go.

Not only are all commercial-use pesticides tracked, the label database also includes all homeowner products registered in Washington and Oregon. So if what you really want is a list of disinfectants claiming to be “fresh air” scented, the PICOL label database can tell you that as well. (However, for a search this odd, we just might have to charge you.) I cannot tell a lie: It isn’t always obvious how to get the database to give you what you want. However, our nimble-brained staff is always ready, willing, and (usually) able to walk you through a search.

The main person responsible getting label information into the computer is our Database Coordinator, Ms. Charlee Parker. Charlee spends so much time focused on inputting label information that passersby have accused us of chaining her to her desk. (OK, now, before you get too worried, we do let her take an occasional break and once in a while, she even gets lunch.) Thanks to Charlee’s diligent efforts, we are nearly current with data entry (no small feat!) and should have all 1999 registrations entered in the label database before the end of the year. (Note that even this late in the year we are still receiving Oregon and Washington 1999 registration information.) The other big plus to having Charlee on our staff is her attention to detail. She looks at everything very carefully and has even been known to spot the occasional error, enabling us to improve the existing database while adding volumes of current information.

Is Anybody Out There?

In thinking about all of the time and effort we (this is

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PICOL Database, cont.

Jane M. Thomas, Pesticide Notification Network Coordinator

the royal we of course) spend getting information into the label database, I couldn't help but wonder:

- Is there anyone out there who cares?
- Is anybody using the label database?
- Should we unchain Charlee and let her move on to doing other things?

Luckily this soul searching has come to an end. Late last year, with help from the computer folks on our Pullman compus, we installed a log-in screen that requires all PICOL label/tolerance database users to provide us with some information about who they are and why they are accessing the system. This feature allows us to track database usage. (Some would argue that while we don't actually charge for use of the databases we do extract our fees via an annoyance factor.) Alas, there is no way to avoid this log-in step. Even the PIC staff must log in each time we want to access either of the label or tolerance databases.

"You Like Us, You Really Like Us…"

The results are in but the news is mixed:

- Yes, people do care.
- Yes, the label database is getting used.
- But no, Charlee must remain chained to her desk.

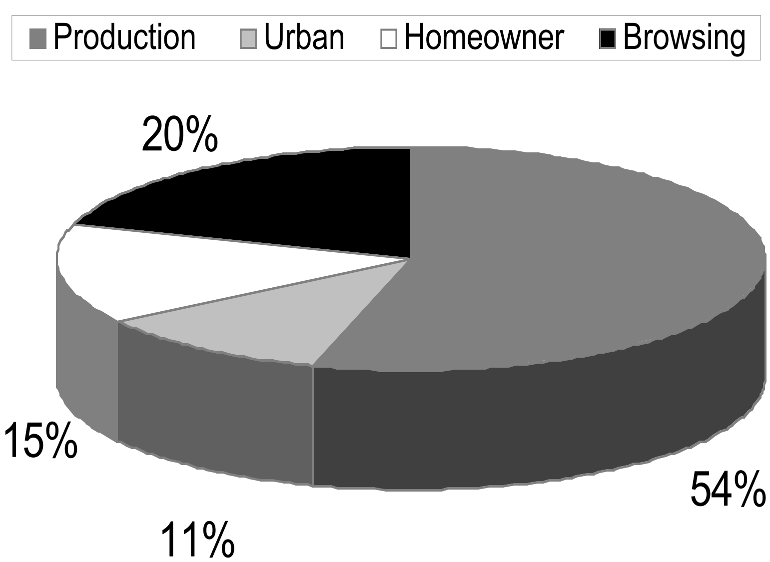
We have been tracking usage of the label database since the first of the year and tabulating our "hits" by location. As Table 1 shows, Washington residents comprise the majority of database users. We have done the requisite self-assessment: our office accounts for approximately 22% of the Washington hits (and 16% of total database access).

Because the label database provides information for a variety of uses, we also ask (read: "require") our users to tell us why they are accessing the system each time they log on. The customers have the option of selecting production agriculture, commercial applications in urban areas, homeowner-type application, or just browsing the system. Far and away, most of the label database users are inquiring about production agriculture, with the remainder split between the urbane urbans, banal browsers, and humble homeowners (see Table 2).

Whether you are looking for a "country fresh" disinfectant or a way to control green peach aphid in radish seed, come on, try out the PICOL label database. It's here. It's wow. (It's free.)

This article was prepared by Pesticide Notification Network Coordinator Jane M. Thomas. For comments, questions, or a nimble-brained assist with a database query, contact Jane at (509) 372-7493 or ***jmthomas@tricity.wsu.edu****.*

TABLE 2 - 1999 PICOL Label Database
Use by Query Type



PNN Update

Jane M. Thomas, Pesticide Notification Network Coordinator

The PNN is operated by WSU's Pesticide Information Center for the Washington State Commission on Pesticide Registration. The system is designed to distribute pesticide registration and label change information to groups representing Washington's pesticide users.

PNN notifications are available on our web page. To review those sent out in September either access the PNN page via:

Pesticide Information Center On-Line (PICOL) Main Page:
http://picol.cahe.wsu.edu/
or directly:
http://www.tricity.wsu.edu/~mantone/pl-newpnn.html.

We hope that this new electronic format will be useful. Please let us know what you think by submitting comments to Jane Thomas at (509) 372-7493 or **jmthomas@tricity.wsu.edu**.

AEN Y2K Subscription Reminder

If you receive a hard-copy *Agrichemical and Environmental News* subscription, now is the time to renew for next year. Renewals received by November 30 will ensure uninterrupted service. The subscription fee remains at $15 per year for 12 riveting issues, which merely covers the costs of printing and mailing. Web access remains free; the URL is www2.tricity.wsu.edu/aenews. For a hard copy, send your check, made out to WSU, to

Pesticide Information Center
WSU Tri-Cities
2710 University Drive
Richland WA, 99352-1671

Please include full name and address of newsletter recipient. Should you require an invoice, just let us know by phoning (509) 372-7378. As always, we welcome your comments, feedback, and topic suggestions. Send them along with your check or anytime by e-mail to Managing Editor Catherine Daniels at **cdaniels@tricity.wsu.edu** or Editor Sally O'Neal Coates at **scoates@tricity.wsu.edu**.

If you would like a hard-copy subscription of *Agrichemical and Environmental News* delivered in 2000, NOW is the time to respond!

Federal Register Summary

Jane M. Thomas, Pesticide Notification Network Coordinator

In reviewing the September postings in the Federal Register, we found the following items that may be of interest to the readers of *Agrichemical and Environmental News*.

In the September 1 Federal Register, EPA announced that the revised risk assessments and related documents for ethoprop, fenamiphos, phorate, and terbufos were available for review and comment. These risk assessments can be accessed on the web at **http://www.epa.gov/pesticides/op/status.htm**. (Page 47784)

In the September 2 Federal Register, EPA announced that the preliminary human health risk assessments and related documents for coumaphos were available for review and comment. These documents are available on the web at **http://www.epa.gov/pesticides/op/coumaphos.htm**. (Page 48164)

In the September 17 Federal Register, EPA proposed establishing procedures for the registration of antimicrobial products, labeling standards for antimicrobial public health products (to ensure that these products are appropriately labeled for the level of antimicrobial activity they demonstrate), modifying its notification process for antimicrobial products, and exempting certain antimicrobial products from FIFRA regulation. The agency also proposes to interpret the applicability of the new FIFRA definition of "pesticide" that excludes liquid chemical sterilants from FIFRA regulation and includes nitrogen stabilizers, and to describe requirements pertaining to use dilution labeling. Comments on these proposed actions may be submitted to EPA until November 16, 1999. (Page 50671)

Tolerance Information

Jane M. Thomas, Pesticide Notification Network Coordinator

Tolerance Information						
Chemical (type)	Federal Register	Tolerance (ppm)	Commodity (raw)	Time-Limited		
				Yes/No	New/Extension	Expiration Date
cymoxanil (fungicide)	9/1/99 page 47687	1.00	dried hops	Yes	Extension	15-Oct-01
Comment: This time-limited tolerance is being extended in response to a request received by EPA to extend the use of cymoxanil for downey mildew control on hops for this year's growing season.						
difenoconazole (fungicide)	9/1/99 page 47680	0.10	sweet corn (forage & stover)	Yes	New	31-Jan-01
		0.10	sweet corn (kernel + corn with husk removed)			
Comment: This time-limited tolerance is being issued in response to EPA granting a Section 18 for the use of difenconazole on Idaho sweet corn seed.						
avermectin B (insecticide)	9/7/99 page 48548	0.02	grapes	No	N/A	N/A
		0.02	peppers			
		0.20	dried hops			
		0.01	potatoes			
		0.02	cattle meat & mbp			
		0.01	milk			
		0.10	wet apple pomace			

Tolerance Info, cont.

Jane M. Thomas, Pesticide Notification Network Coordinator

Tolerance Information

Chemical (type)	Federal Register	Tolerance (ppm)	Commodity (raw)	Time-Limited Yes/No	Time-Limited New/Extension	Time-Limited Expiration Date
sulfentrazone (herbicide)	9/21/99 page 51060	0.10	sunflowers	Yes	New	30-Dec-00
		0.10	bean, succulent seed without pod (lima beans & cowpeas)			
Comment: These time-limited tolerances are being issued in response to EPA granting Section 18 exemptions for the use of sulfentrazone to control kochia in North Dakota sunflowers, and hop hornbeam copperleaf in lima beans and cowpeas grown in Tennessee.						
tebuconazole (fungicide)	9/22/99 page 51248	2.00	barley grain	Yes	Extension	31-Dec-00
		20.00	barley hay			
		20.00	barley straw			
		15.00	wheat hay			
		2.00	wheat straw			
		0.10	milk			
		0.20	mbp of cattle, goats, hogs, horses, poultry, and sheep			
Comment: These time-limited tolerances are being extended in response to requests from various states for Section 18 exemptions for the use of tebuconazole on barley and wheat.						
spinosad (insecticide)	9/23/99 page 51451	0.15	wheat	No	N/A	N/A
		0.30	cucurbit vegetables			
		0.30	edible podded legumes			
		0.20	stone fruit			
		0.02	corn grain (inc. field and pop)			
		1.00	sorghum grain			
		0.02	wheat grain			
		1.00	cereal grain (forage, fodder, hay, stover, and straw)			
		20.00	aspirated grain fractions			
		0.20	poultry, fat			
		0.02	poultry; meat, mbp, and eggs			
		0.02	succulent shelled peas and bean legumes			
		0.02	dried shell pea and bean (except soybean) legumes			
Note: This action also increases the following tolerances to the levels listed below.						
		0.15	meat of cattle, goats, hogs, horses and sheep			
		1.00	mbp of cattle, goats, hogs, horses, and sheep			
		3.50	fat of cattle, goats, hogs, horses, and sheep			
		0.50	milk, whole			
		5.00	milk fat			
trifloxystrobin (fungicide)	9/27/99 page 51901	0.50	pome fruit	No	N/A	N/A
		0.50	cucurbit vegetables			
		2.00	grapes			
		5.00	raisins			
		0.02	wet apple pomace			
		0.02	milk			
		0.05	meat, fat, and mbp of cattle, goats, hogs, horses, and sheep			
diflubenzuron (insecticide)	9/29/99 page 52450	0.50	pears	Yea	New	31-Mar-01
Comment: This time-limited tolerance is being established in response to EPA granting a Section 18 exemption for the use of diflubenzuron to control pear psylla on pears grown in Oregon and Washington.						
pymetrozine (insecticide)	9/29/99 page 52438	0.02	tuberous and corm vegetables (Subgroup 1-C)	No	N/A	N/A
tebufenozide (insecticide)	9/29/99 page 52457	0.30	turnip roots	No	N/A	N/A
		9.00	turnip tops			
		4.00	canola, refined oil			
		2.00	canola seed			